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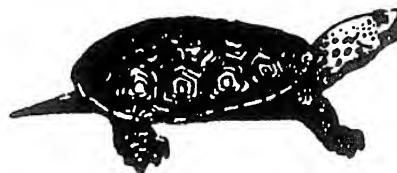
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# Maryland Herpetological Society

DEPARTMENT OF HERPETOLOGY

THE NATURAL HISTORY SOCIETY OF MARYLAND, INC.



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# BULLETIN OF THE



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Volume 45 Number 2

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The Maryland Herpetological Society  
Department of Herpetology, Natural History Society of Maryland, Inc.

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## Membership Rates

Membership in the Maryland Herpetological Society is \$25.00 per year and includes the Bulletin of the Maryland Herpetological Society. Foreign is \$35.00 per year. Make all checks payable to the Natural History Society of Maryland, Inc.

## Meetings

Meetings are held monthly and will be announced in the "Maryland Herpetological Society" newsletter and on the website, [www.maryland-nature.org](http://www.maryland-nature.org).



## Notes on Reproduction of the Ring-tailed Bicycle-dragon, *Ctenophorus caudicinctus* (Squamata: Agamidae) from Australia

Stephen R. Goldberg

*Ctenophorus caudicinctus* occurs from far western Queensland, through the Northern Territory and northern South Australia to most of Western Australia (Cogger, 2000). Previous information on reproduction of *C. caudicinctus* is in Pianka (1986), Bradshaw et al. (1991) and Ehmann (1992). The purpose of this note is to add information on the reproductive biology of *C. caudicinctus* from a histological examination of gonadal material from museum specimens. Histological evidence is given that *C. caudicinctus* females produce multiple clutches in the same year. Minimum sizes for reproduction are given for males and females. The possibility that geographic variation occurs in the reproductive cycle of *C. caudicinctus* is discussed.

Fifty *C. caudicinctus* (30 males, mean snout-vent length, SVL = 63.3 mm  $\pm$  6.4 SD, range = 52–80 mm; 19 females, SVL = 57.3 mm  $\pm$  3.8 SD, range = 50–65 mm, and one neonate, SVL = 23 mm) were examined from the herpetology collection of the Natural History Museum of Los Angeles County (LACM), Los Angeles, California. Lizards were collected 1966 and 1968 between 28°26'S to 27°05'S and 120°40'E to 119°07'E in Western Australia and at 23°28'S and 132°16'E in Northern Australia.

The following *C. caudicinctus* were examined from Northern Australia: LACM 55091 and Western Australia: LACM 55092, 55095, 55096, 55100, 55101, 55103, 55106–55108, 55110–55113, 55115–55119, 55123–55128, 55130–55133, 55137, 55139, 55141, 55142, 55144–55147, 55151, 55152, 55154–55156, 55158, 55160–55164, 55166, 55167.

Gonads were dehydrated in ethanol, embedded in paraffin, sectioned at 5  $\mu\text{m}$  and stained with Harris' hematoxylin followed by eosin counterstain (Presnell and Schreibman, 1997). Enlarged ovarian follicles ( $> 4$  mm width) or oviductal eggs were counted. Histology slides were deposited at LACM. Male and female mean body sizes (SVL) were compared with an unpaired *t* test using Instat (vers. 3.0b, Graphpad Software, San Diego, CA).

Males were significantly larger than females (unpaired *t* test,  $t = 3.7$ ,  $df = 47$ ,  $P = 0.0006$ ). The only stage in the testicular cycle observed was spermiogenesis (= sperm formation) in which the seminiferous tubules are lined by clusters of spermatozoa or rows of metamorphosing spermatids. Samples from the following months were examined: October ( $n = 1$ ), November ( $n = 2$ ), December ( $n = 9$ ), January ( $n = 18$ ). The smallest reproductively active male (spermiogenesis in progress) measured 52 mm SVL (LACM 55111).

Monthly stages in the ovarian cycle are in Table 1. Females exhibited reproductive activity in three of the four months sampled. There is evidence in the January *C. caudicinctus* female sample that more than one egg clutch can be produced in the same reproductive season. This is because one female from January with enlarged ovarian follicles ( $> 4$  mm) for a subsequent clutch contained corpora lutea from a previous clutch and a second female with oviductal eggs, (soon to be deposited), was undergoing concomitant yolk deposition for a subsequent egg clutch. Mean clutch size ( $n = 5$ ) was  $3.6 \pm 1.3$ , range = 2–5. The smallest reproductively active female measured 53 mm (LACM 55144, corpora lutea present). Ehmann (1992) reported clutch sizes of three to eight eggs and Pianka (1986) reported a mean of  $5.4 \pm 2.0$  SD for 18 gravid females.

**Table 1.** Monthly stages in the ovarian cycle of 19 *Ctenophorus caudicinctus* from Western Australia.

Month	<i>n</i>	No yolk deposition	Early yolk deposition	Enlarged follicles > 5mm	Oviductal eggs
October	1	1	0	0	0
November	1	0	1	0	0
December	2	2	0	0	0
January	15	7*	3	4**	1***

\*3 females also contained corpora lutea; \*\*1 female also contained corpora lutea from a previous clutch; \*\*\*1 female was also undergoing concurrent yolk deposition for a subsequent clutch.

One presumably neonate of *C. caudicinctus* (SVL = 23 mm, LACM 55126) was collected January 1968.

In previous papers (Bradshaw et al., 1991; Saint Girons et al., 1992) it was reported that *C. caudicinctus* did not enter breeding condition until late summer (February-March) at Mallina Station (21°S, 118°E) in the Pilbara region of Western Australia. This contrasts with my observations on *C. caudicinctus* that yolk deposition was underway in November (Austral spring), eggs had already been deposited in January, males were producing sperm from October through January and one neonate was collected in January. Similarly, Ehmann (1992) reported gravid *C. caudicinctus* females were collected November to March. Subsequent investigations are needed to ascertain the degree of geographic variation in the reproductive cycle of *C. caudicinctus*.

I thank Christine Thacker (LACM) for permission to examine lizards.

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## Reproductive Cycle of Gilbert's Skink, *Plestiodon gilberti* (Squamata: Scincidae) from California

Stephen R. Goldberg

### Abstract

The reproductive cycle of *Plestiodon gilberti* is described from a histological study of museum specimens. This constitutes the first histological examination of gonadal material from this species. Sample sizes indicate *P. gilberti* is active mainly in spring and early summer. *Plestiodon gilberti* is a member of the North American Skink "guild" in which reproduction occurs in winter to early spring. A new maximum clutch size ( $n = 11$ ) is reported for *P. gilberti*. The smallest reproductively active male *P. gilberti* male measured 63 mm SVL; the smallest reproductively active female measured 58 mm SVL. .

### Introduction

Gilbert's skink, *Plestiodon gilberti* occurs in a variety of habitats in California, including foothills and middle elevations of the Sierra Nevada, inner coast ranges, south into the mountains of southern California (Stebbins 2003). The biology of *P. gilberti* is summarized in Bruce (1985). Information on its reproduction is in Dixon (1967), Punzo (1982), Stebbins (2003), Lemm (2006). The purpose of this paper is to report additional information on the reproductive cycle of *P. gilberti* in California from a histological examination of museum specimens. The first histological information on the testicular cycle of *P. gilberti* is provided. Comparisons are made with the timing of reproduction of other North American scincid lizards. Information on the reproductive biology of an organism is an integral part of its natural history.

### Materials and Methods

A total of 107 *P. gilberti* (59 males, mean snout-vent length, [SVL] = 86.1 mm  $\pm$  14.3 SD, range = 60-122 mm; 40 females, SVL = 77.0 mm  $\pm$  13.6 SD, range = 56-103 mm and eight juveniles, SVL = 31.4 mm  $\pm$  2.2 SD, range = 27-33 mm) from California were examined from the herpetology collection of the Natural History Museum of Los Angeles County, Los Angeles, California (LACM).

Specimens of *P. gilberti* examined by California county from the Natural History Museum of Los Angeles County (LACM), Los Angeles, California. **El Dorado:** LACM 99534, 99535; **Inyo:** LACM 52720; **Kern:** LACM 14925-14929, 27534, 27536- 27540, 27542, 27543, 27547, 27550, 27551, 27554, 27556, 27558, 27560-27563, 27567, 62414, 99538, 99539, 99541-99543, 99547, 99548; **Los Angeles:** LACM 14924, 27520; **Madera:** LACM 27521-27523, 99553-99555, 99557, 99559-99562, 99564, 99565, 99567, 99569, 99571, 99572, 137853; **Mariposa:** LACM 52728; **Orange:** LACM 99573, 99574; **Riverside:** LACM 14930, 22675, 22682, 22683, 22685, 22690, 22693, 22695-22699, 22706, 22707, 22726, 73677-73679, 99575, 99579, 99581-99587, 99591, 99592, 99594; **San Bernardino:** LACM: 5936, 14934, 14935, 22692, 23268-23271, 23273, 23278, 23282-23285, 62410, 99595, 99597, 99598, 99601; **Stanislaus:** LACM 14921; **Tulare:** LACM 99603, 99604; **Tuolumne:** LACM: 62415.

The left testis, epididymis and left ovary were removed from males and females, respectively. Gonads were embedded in paraffin, sectioned at 5  $\mu\text{m}$ , and stained with Harris' hematoxylin followed by eosin counterstain (Presnell and Schreibman 1997). All enlarged follicles (> 5 mm

length) were counted, but no histology was performed on them. Histology slides are deposited in LACM. Male and female mean body sizes were compared with unpaired *t*-tests using Instat (vers. 3.0b, Graphpad Software, San Diego, CA).

### **Results**

The testicular cycle was divided into three stages: (1) Regression, in which seminiferous tubules contained primarily spermatogonia and Sertoli cells. The germinal epithelium was reduced to 1-2 cell layers, (2) Recrudescence, there is a proliferation of germ cells as recovery for the next period of sperm production (spermiogenesis) is underway. In early recrudescence, primary spermatocytes are the most abundant cell, some are dividing. In late recrudescence, secondary spermatocytes and spermatids predominate; (3) Spermiogenesis, seminiferous tubules are lined by clusters of spermatozoa and/or rows of metamorphosing spermatids.

Males were significantly larger than females (unpaired *t*-test = 3.4, df = 97, *P* = 0.0010). Monthly changes in the testicular cycle are shown in Table 1. The main period of spermiogenesis encompasses late spring (May-June). Recrudescence begins in autumn and is completed by the following spring. Regression begins in late spring and continues into summer. The smallest reproductively active male (spermiogenesis in progress) measured 63 mm SVL (LACM 23284) and was collected in May.

**Table 1.** Monthly changes in stages of the *Plestiodon gilberti* testicular cycle from California.

Month	<i>n</i>	Regression	Recrudescence	Spermiogenesis
February	4	1	2	1
March	10	0	7	3
April	14	0	10	4
May	13	1	1	11
June	13	3	0	10
August	2	2	0	0
September	2	1	1	0
November	1	0	1	0

Three stages were present in the female reproductive cycle: (1) no yolk deposition (= quiescent); (2) early yolk deposition as seen in the presence of densely staining basophilic yolk granules; (3) enlarged ovarian follicles > 5 mm diameter noted prior to ovulation.

Monthly changes in the ovarian cycle are in Table 2. The main period of female reproductive activity occurs in spring as evidenced by 45% of females from March-May undergoing early yolk deposition (Table 2). The smallest reproductively active female (early yolk deposition in progress) measured 58 mm SVL and was collected in April (LACM 99569). No females with oviductal eggs were collected. One female with 11 enlarged ovarian follicles (> 5 mm diameter) (LACM 99541) was collected in May.

Presumed neonates were collected in August (*n* = 3, range 32-33 mm) and September (*n* = 3, range 30-33 mm) suggesting oviposition occurred in late spring or early summer. One *P. gilberti* measuring 27 mm SVL (LACM 99574) was collected in February and was likely born in late summer of the previous year.

**Table 2.** Monthly changes in the ovarian cycle of *Plestiodon gilberti* from California.

Month	n	No yolk deposition	Early yolk deposition	Enlarged follicles > 5mm
February	1	1	0	0
March	11	5	6	0
April	19	12	7	0
May	3	0	2	1
June	1	0	0	1
July	1	1	0	0
August	1	1	0	0
September	3	3	0	0

### Discussion

Both *P. gilberti* and the congeneric *Plestiodon skiltonianus* are secretive lizards which are mainly active in the spring (Stebbins 1954). This explains why my samples are quite small during late summer and autumn (Tables 1-2). In the southern part of its range, *P. gilberti* and *P. skiltonianus* are active during the mild and wet periods of the year.

Considering other reports on reproduction of *P. gilberti* in California, Dixon (1967) reported clutches of 5 to 9 eggs from Los Angeles County and Punzo (1982) reported a mean clutch size of 6.3, range = 3-8 for 9 clutches from San Bernardino County. There was no evidence that *P. gilberti* produces more than one clutch per year. Stebbins (2003) reported clutches of 3-9 eggs deposited in summer and Lemm (2006) reported as many as nine eggs may be deposited June to August. The eleven enlarged follicles reported herein is a new maximum clutch size for *P. gilberti*. According to Fitch (1970) females of most *Plestiodon* skinks (as *Eumeces*) remain in the nest with the eggs throughout their incubation and the hatchlings may stay together for a short time; one brood is produced per year. In contrast, multiple egg clutches are produced by some spring breeding oviparous phrynosomatid North American lizards (Goldberg 1974, 1975, 1977) which do not remain in their nests during development of the young.

The timing of the reproductive cycle of *P. gilberti* places it in the "guild" of North American skinks in which most reproductive activity occurs during late winter-early summer, such as: *P. septentrionalis* (Breckenridge 1943), *P. obsoletus* (Hall 1971), *P. laticeps* (Vitt and Cooper 1985), *P. anthracinus* and *P. fasciatus* (Trauth 1994), *P. inexpectatus* (Vitt and Cooper 1986) and *P. skiltonianus* (all as *Eumeces*) (Goldberg 2005). Eggs hatch in late summer to early autumn which allows young opportunity to feed and grow before hibernating. In contrast, *Plestiodon egregius* (as *Eumeces*) reproduces during autumn in Florida (Mount 1963).

Also, the reproductive pattern of *P. gilberti* sharply differs from that of the Mexican viviparous skinks, *Plestiodon copei*, *Plestiodon lynxei* and *Plestiodon brevirostris*, (all as *Eumeces*) from Mexico in which mating occurs in summer but ovulation occurs in autumn, embryos develop in winter followed by parturition in spring (Ramirez-Bautista et al. 1996, 1998, Goldberg 2002).

Acknowledgments

I thank Christine Thacker (LACM) for permission to examine *P. gilberti* and Sean Kirk (Whittier College) for assistance with histology.

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*News and Notes:*

Harris (2009) mentioned that the NHSM was in the process of gathering Species Accounts, for all of Maryland's amphibians and reptiles, to be placed on the NHSM/DNR Website and eventually be published as a hard copy. This issue of the Bulletin of the Maryland Herpetological Society, contains the first series of these accounts, placed in a forum for any corrections/additions etc. prior to actual publication. These accounts will be authored by many individuals and when this project is completed will be a valuable asset to both the amateur and professional alike.

I would like to thank Dr. John E. Cooper of the North Carolina State Museum of Natural Sciences for his diligent editing of the Species Accounts.

Please send all comments to Herb Harris either by USPS or e-mail ([hsharris@juno.com](mailto:hsharris@juno.com)).

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*News and Notes:***American Bullfrog, *Lithobates catesbeianus***

The American Bullfrog is Maryland's largest frog, with body lengths of 3 ½ to 8 inches (9.0 to 20.3 cm). The body is green to yellow and brown or gray. The head typically is green and the belly whitish or yellowish, mottled with gray. American Bullfrogs do not have dorsolateral ridges (skinfolds) extending down their sides, but do have short ridges that extend from the backs of the eyes and wrap around the large tympanums (eardrums). The hind legs may have dark bands. The hind feet are fully webbed except for the last section of the fourth toe. Males and females are of nearly equal size. Males have a yellowish chin and their eardrums are larger than their eyes. Females have a white chin and their eardrums are smaller than or equal in size to their eyes.



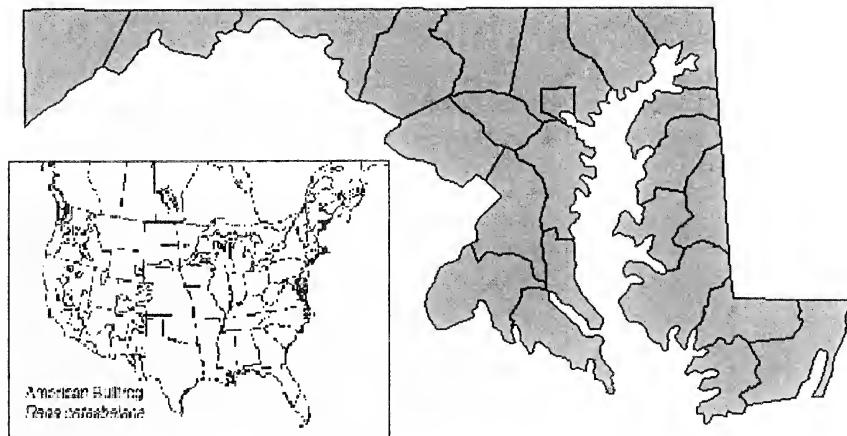
American Bullfrog (Frederick County, Maryland) Wayne G Hildebrand ©

**Distribution**

The original distribution of the American Bullfrog encompassed much of eastern North America, from southern Canada, south to Florida and the Gulf Coast, and west into the Great Plains and Rocky Mountains. It has been introduced into many areas of the United States and other countries. Its range in Maryland is statewide.

**Breeding**

The breeding call of the male is a deep, "jug-o-rum," and larger males produce deeper calls than smaller males ([add link to call](#)). The calls may carry up to 0.25 mi (0.4 km). Breeding occurs from March through August in Maryland. Females lay 6,000 to over 20,000 eggs in a jelly-like sheet that may measure up to 24 inches (0.6 m) in diameter and floats on the water's surface. The eggs are about 0.05 to 0.07 inches (0.12 to 0.17 cm) in diameter and they hatch in about two to five days. Tadpoles obtain a total length of from 4 to 6 ¾ inches (10.0 to 17.1 cm) and take from

*News and Notes:*

*American Bullfrog distributional map.*

one to two years to transform. Froglets measure about 1 1/8 to 2 1/4 inches (2.9 to 5.7) long. Sexual maturity is reached after several more years for both males and females.

### **Habitat**

The American Bullfrog's preferred habitats are large bodies of permanent water such as lakes, ponds and slow-flowing streams. Man-made ponds such as golf course water traps, farm ponds, and goldfish ponds also provide ideal habitat.

### **Status**

The American Bullfrog is one of the most common anurans in Maryland. Globally its status is secure and it is likely that the frog's numbers are increasing. Its preference for man-made ponds, along with its high reproductive rate, large larval size, and voracious appetite, often displaces native frogs in areas where it has been introduced.

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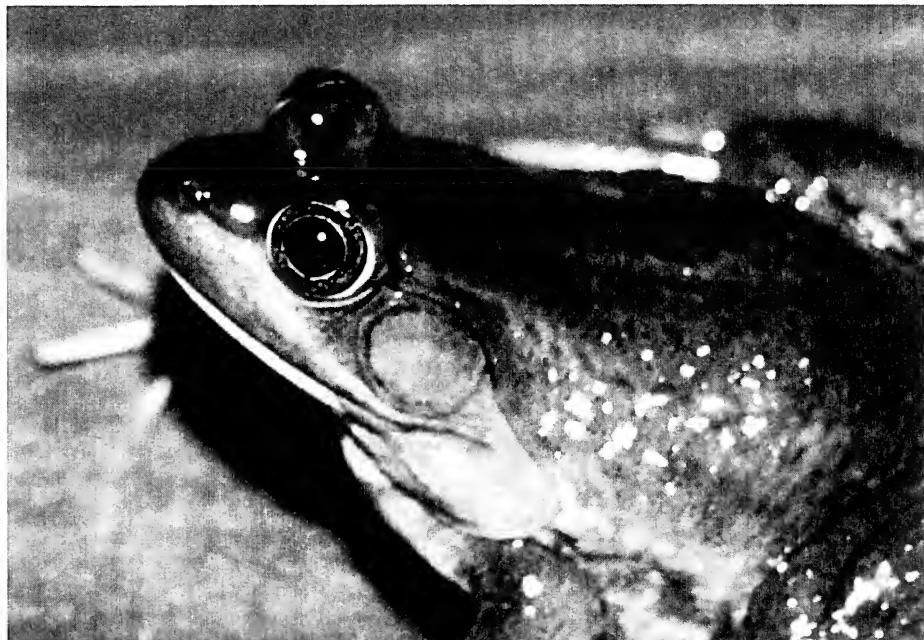
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*News and Notes:***Carpenter Frog, *Lithobates virgatipes***

An adult Carpenter Frog measures from 1 5/8 to 2 5/8 inches (4.1 to 6.7 cm) in length. The body coloration is brown with four light stripes on the back and sides. Like the Bullfrog, the Carpenter Frog lacks dorsolateral ridges (skin folds) extending the length of its back, but has short ridges that extend from the eye and curve around the tympanums (eardrums). The belly is cream colored, usually with dark mottling. Males have tympanums that are larger than their eyes, and in females they are the same size or smaller than the eyes.



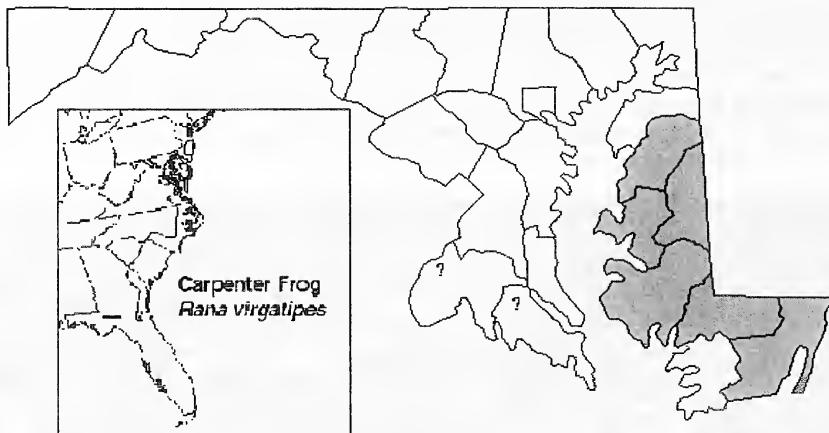
*Carpenter Frog (Gates County, North Carolina). Wayne G Hildebrand ©*

**Distribution**

The Carpenter Frog has scattered populations in southern New Jersey, the Delmarva Peninsula, and eastern Virginia. The distribution resumes in southeast Virginia and follows the coast south into extreme northern Florida. In Maryland it is found exclusively on the lower Eastern Shore. There is a single report of the frog in Charles County near Mason Springs, and another report from the 2003 NAAMP survey in Saint Marys County near Mechanicsville. Further study is needed to determine if these reports are accurate and represent range extensions.

**Breeding**

The breeding call of the Carpenter Frog is like the hammering carpenters “pu-tunk, pu-tunk, pu-tunk”, rapidly repeated several times. In Maryland the frog breeds from March through July, laying egg clutches that contain up to 600 eggs attached to submerged vegetation. The masses are ovoid and measure 2 ½ to 4 inches (6.5 to 10.0 cm). A single egg measures about 0.06 to 0.07

*News and Notes:**Carpenter Frog distributional map*

inches (0.15 to 0.18 cm) in diameter, and the eggs hatch in about seven days. The tadpole stage lasts approximately a year. The tadpole attains a maximum length of 3 3/8 to 3 5/8 inches (8.8 to 9.2 cm) and newly transformed frogs measure 7/8 to 1 1/4 inches (2.3 to 3.1 cm) in length. It takes more than two years for male and female Carpenter Frogs to reach reproductive age.

**Habitat**

Carpenter Frogs are associated with sphagnum bogs, cypress swamps, pine surrounded wetlands, and Delmarva Bays, where the water is typically more acidic than other frogs can tolerate.

**Status**

The Carpenter Frog is considered secure throughout its overall range. This range, however, includes many disjunct populations that are severely threatened by habitat loss and degradation. The Maryland DNR lists the species as "Watchlist or In Need of Conservation". Because of extensive land clearing for agriculture, little remains of the acidic habitats that this species prefers. When the waters of its habitats become less acidic due to increased runoff from cleared land, other more hardy species, such as the American Bullfrog and the Green Frog, can invade and eventually out-compete and displace the Carpenter Frog.

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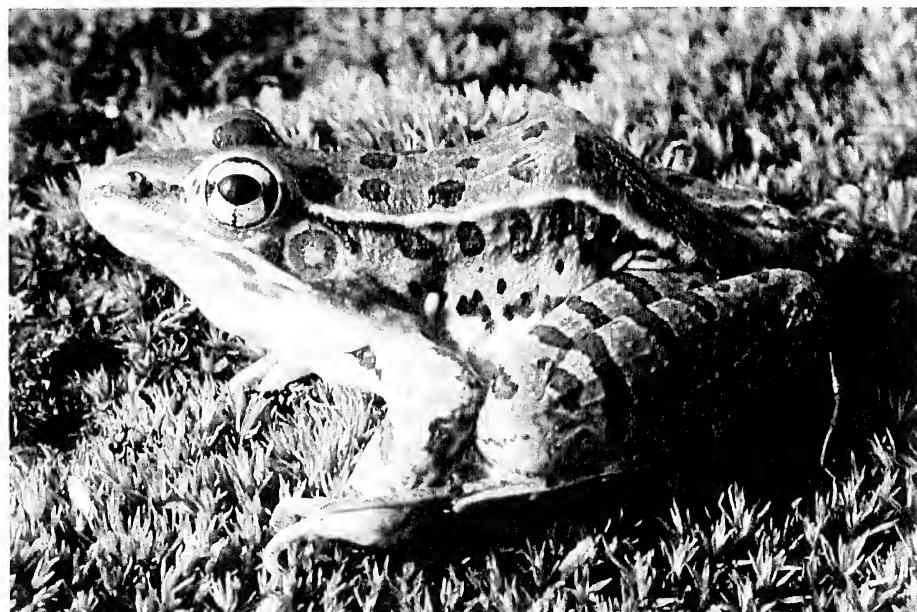
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*News and Notes:***Southern Leopard Frog, Lithobates sphenocephalus utricularius**

The Southern Leopard Frog measures about 2 to 5 inches (5.1 to 12.7 cm) in length. The body coloration is brown or green with dark roundish spots with light borders. Conspicuous light colored skin folds (dorsolateral ridges) are present. The color of the belly is white and dark banding is present on the hind legs. Distinguishing characteristics of this frog are the light lines on the upper jaw and the central light spot on the tympanum. The snout is usually more pointed than that of the Northern Leopard Frog. Male Southern Leopard Frogs are smaller than females.



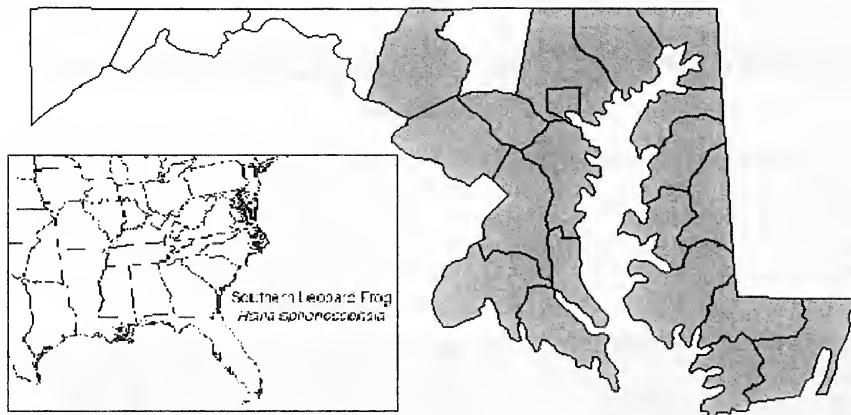
*Southern Leopard Frog (Frederick County, Maryland). Wayne G Hildebrand ©*

**Distribution**

The Southern Leopard Frog can be found from extreme southern New York south through Florida, west to Central Texas, and north to central Illinois in the Mississippi drainage. Historically, it was considered a Coastal Plain species in Maryland, but has recently been found in Frederick County in the Piedmont Plateau.

**Breeding**

The breeding call of the Southern Leopard Frog is a series of clucks repeated several times. A raspy snarl may follow. The call resembles the noise made by an old car trying to start. The sound is produced by a pair of external vocal sacs. The male emits the breeding call while floating. Breeding in Maryland occurs from February through June. Permanent, vernal and even slightly brackish water is used. Oval egg masses, measuring 5 to 6 inches (12.5 to 15.0 cm) across,

*News and Notes:**Southern Leopard Frog distributional map.*

contain several hundred to 2,000 eggs and are attached to submerged plants. The individual eggs measure about 0.06 inches (0.16 cm) in diameter and hatch in about 7 to 14 days. Newly hatched tadpoles measure  $\frac{3}{4}$  to 1 inch (2.0 to 2.5 cm) and attain a length of  $2\frac{1}{2}$  to  $3\frac{1}{3}$  inches (6.5 to 8.5 cm). Transformation into juvenile frogs requires 60 to 90 days. The juveniles measure about  $\frac{3}{4}$  to 1 inch (2.0 to 2.5 cm) long, and have a metallic appearance. The frog's age at maturity is between two and three years.

**Habitat**

Southern Leopard Frogs prefer shallow freshwater habitats such as marshes, ponds, swamps, and ditches. They sometimes enter brackish marshes. They may venture great distances away from water into vegetated fields.

**Status**

The Southern Leopard Frog is common over its entire distributional range and its populations are probably stable. It is considered common in Maryland

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*News and Notes:***Pickerel Frog, *Lithobates palustris***

The Pickerel Frog reaches a length of 1 3/4 to 3 3/8 inches (4.4 to 8.7 cm) in length, and females are much larger than males. The dorsal coloration is olive green to tan, with 2 parallel rows of dark squarish blotches. A prominent skin fold (dorsolateral ridge) runs along each side of the back, and there are additional dark spots on the sides of the body. A light line is present on the upper jaw. The belly is plain whitish with brilliant yellow to orange under the hind legs. This coloration may extend forward along the lower sides to under the front legs. The upper surfaces of the hind legs appear barred with dark bands and the front legs have dark spotting. Young Pickerel Frogs appear metallic and lack the bright underleg coloration.



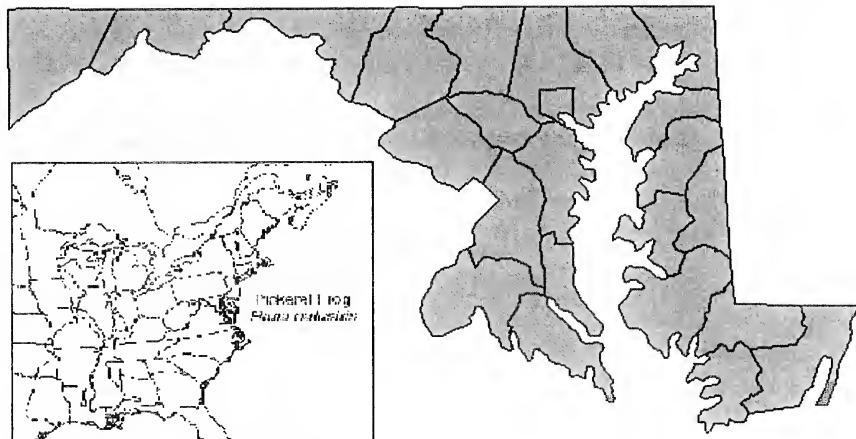
Pickerel Frog (Frederick County, Maryland). Wayne G Hildebrand ©

**Distribution**

The Pickerel Frog's distribution extends from coastal Canada south to South Carolina, west to Eastern Texas, and north to extreme eastern Minnesota. Extensive gaps in the range exist in northwestern Ohio, much of Illinois and the adjoining states, and areas in the southern section of the range. The published Maryland distribution is statewide.

**Breeding**

The breeding call of the Pickerel Frog is a slow snore lasting for one to two seconds. Males chorus from the edges of ponds and sometimes from under water. Because the call is low-pitched and low volume it cannot be heard at a distance. Calls are produced through a pair of external vocal sacs. Breeding occurs from March through June in Maryland. A female lays about 2,000 to 3,000 yellow and brown eggs in a bulbous mass measuring 3 3/8 to 4 inches (8.7 to 10.0 cm). The masses are typically attached to submerged aquatic vegetation. Individual eggs measure about 0.06

*News and Notes:**Pickerel Frog distributional map.*

inches (0.16 cm) and hatch in seven to fourteen days. Tadpoles attain a length of up to 3 ¼ inches (8.0 cm), and metamorphosis requires about 70 to 90 days. Newly transformed frogs measure ¾ to 1 inch (1.9 to 2.7 cm). It takes about 3 years for the frog to attain maturity.

**Habitat**

The Pickerel Frog occupies a wide variety of wetland habitats, from mountain streams to floodplain swamps. Individuals often venture far from water into open woodlands and meadows. Pickerel frogs are also often found in caves that contain water, and may be active year round if the temperature permits.

**Status**

Pickerel Frogs are common in Maryland. They are abundant throughout their entire range and their populations are probably stable.

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*News and Notes:***Eastern Spadefoot Toad, *Scaphiopus holbrookii***

Adult Eastern Spadefoot Toads measure 1 ¾ to 2 7/8 inches (4.4 to 7.3 cm) long. The body coloration is brown with a yellowish hourglass-shaped marking on the back (sometimes missing). The belly is white to gray. Unlike the parotoid glands of Maryland's true toads (American and Fowler's Toads), the Spadefoot Toad's parotoid glands are small, round, and unobtrusive. Spadefoot skin is also considerably less warty than true toads, having only small warts (tubercles). The hind feet have black sickle-shaped spades used for digging. The pupils of their large yellow eyes are vertical. Females may be larger than males. Care should be taken when handling Eastern Spadefoot Toads, since some people may experience an allergic reaction to the skin secretion that they produce. Skin irritation, sneezing, a runny nose, and watery eyes are symptomatic of the reaction.



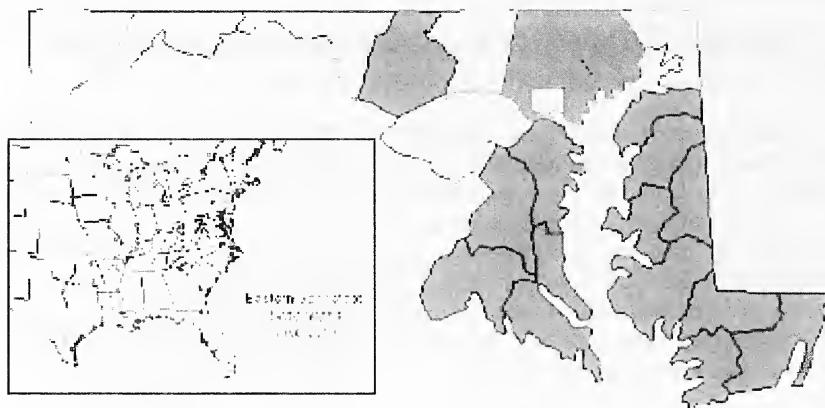
*Eastern Spadefoot Toad (Caroline County, Maryland). Wayne G Hildebrand ©*

**Distribution**

The range of the Eastern Spadefoot Toad extends from southern Massachusetts south in the Coastal Plain to Florida, and west into eastern Louisiana, eastern Arkansas, and southeastern Missouri. Populations occur in much of Tennessee and extend into Kentucky, Indiana, and Ohio. Isolated colonies occur in the Virginias. In Maryland the Eastern Spadefoot Toad is found primarily in the Coastal Plain, but a population occurs in Frederick County in the Piedmont Plateau.

**Breeding**

The Eastern Spadefoot Toad's breeding call is an explosive grunt that is somewhat like the sound of a young crow. Large choruses of breeding males may be heard for over 0.5 mi (0.8

**News and Notes:**

*Eastern Spadefoot Toad distributional map.*

km). The males call while floating in the ponds. Eastern Spadefoot Toads are “explosive breeders”. Breeding in Maryland occurs from March through September, on warm moist nights typically after heavy rains and low barometric pressure. If conditions are unfavorable in a given year, reproduction may not occur. On Maryland’s Eastern Shore, the toads use poorly drained, often man-made depressions, and ephemeral pools for breeding sites. Flooded pastures and ditches are examples of breeding locations. The female deposits about 150 eggs in long strands wrapped among submerged plants or twigs. The strands are about 12 inches (30 cm) long. The egg measures 0.06 to 0.80 inches (0.14 to 0.20 cm) in diameter. They hatch in as little as 24 hours, but may take as long as seven days. The toad’s bronze colored tadpoles attain a length of 1 1/8 inches (2.8 cm). Transformation occurs in from 14 to 63 days, and the new toadlets measure only about 1/3 to ½ inches (0.85 to 1.20 cm) in length.

### Habitat

Eastern Spadefoot Toads prefer sandy, loose soils that allow easy burrowing. They inhabit wooded areas as well as open fields and meadows. Since they spend much of their time underground, little is known about their natural history. Most activity occurs after warm rains or on temperate summer nights.

### Status

The Eastern Spadefoot Toad is considered common over its entire range, including Maryland. Its subterranean nature and unpredictable reproductive events make it difficult to accurately determine the status in Maryland. Much of the toad’s historic range has been developed. Fewer sightings and limited breeding activity has been reported on the Coastal Plain west of the Chesapeake Bay compared to the less developed Coastal Plain to the east of the Bay.

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*News and Notes:***Green Frog, *Lithobates clamitans melanotus***

The Green Frog is one of the most commonly encountered frogs in Maryland. It is a large frog measuring from 2 ¼ to 4 ½ inches (5.7 to 10.8 cm) in length. The body coloration is green to brown on the back with dark brown or grayish spots. The head is typically green and a yellowish line may extend back from the jaw. The hind legs have indistinct dark barring. The belly is white with dark mottling under the head and legs. A skin fold (dorsolateral ridge) extends from behind the eye and down the body but it does not reach the hind legs. Adult males and females are about the same size. Male tympanums are larger than their eyes whereas female tympanums are equal to or smaller than their eyes. During the breeding season the throat of the male becomes yellow.



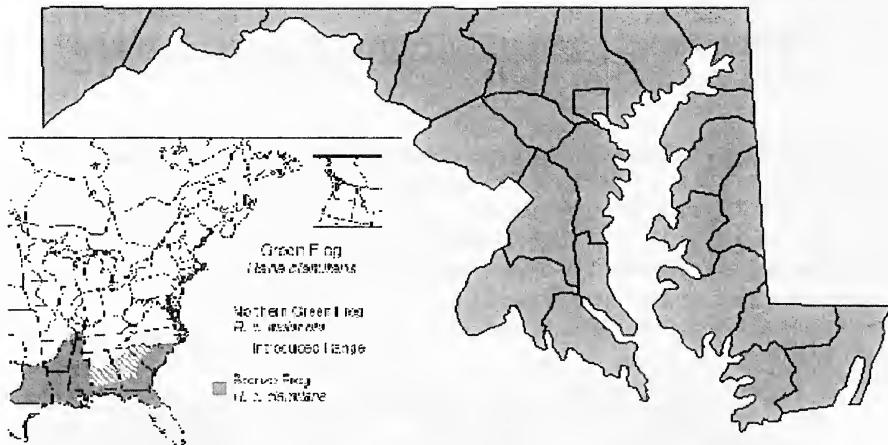
*Green Frog (specimen from Frederick County, Maryland) Wayne G Hildebrand ©*

**Distribution**

The range of the Green Frog reaches into Southern Canada, south into Central Alabama, and West to Central Texas and Minnesota. A gap in the distribution occurs in Illinois and Indiana. This species has also been introduced in many areas outside its native range. In Maryland, Green Frogs are found statewide.

**Breeding**

During the breeding season the male Green Frog makes a call like the plucking of a loose banjo string “gu gu gu”. The call may be repeated briskly two to three times, and is produced by

*News and Notes:****Green Frog distributional map.***

two internal vocal sacs. Breeding occurs from March through August in Maryland. Females lay about 1,000 to 5,000 eggs in a thin film on the water's surface. The egg mass is normally about 12 inches (0.3 m) in diameter. Green Frog eggs are about 0.06 inches (0.15 cm) in diameter. Hatching occurs in from three to five days depending on temperature. The tadpoles attain a length of 2 ½ to 4 1/8 inches (6.5 to 10.5 cm). Transformation may occur at about 70 days but often takes as long as a year. Newly transformed frogs measure approximately 1 to 1 ½ inches (2.3 to 3.8 cm) long. Both male and female Green Frogs reach maturity at about one to three years of age.

**Habitat**

Green Frogs inhabit shallow fresh water such as springs, creeks, brooks, streams, ditches, lakes, and ponds. This species is often encountered along woodland streams but also can be found in open wetland areas.

**Status**

The Green Frog is secure in Maryland and throughout its entire range though some localized populations may be threatened. The Green Frog, like the Bullfrog, is a habitat generalist and easily adapts to almost all fresh water habitats including man-made ponds.

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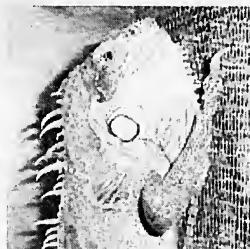
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*Wayne G Hildebrand Maryland Calling Amphibian Coordinator, North American Amphibian Monitoring Program, Keymar, Maryland 21757, wayneh@netstorm.net*

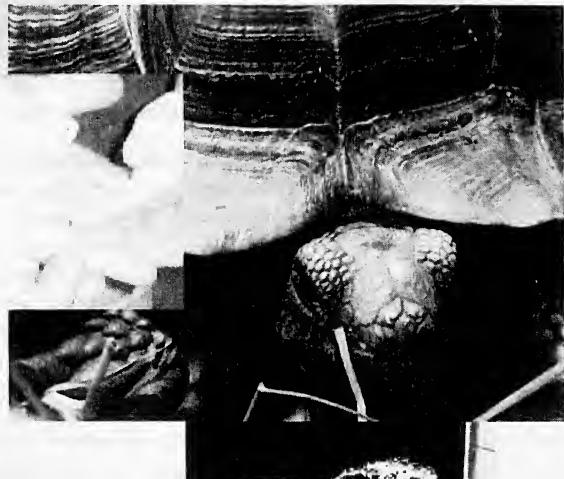
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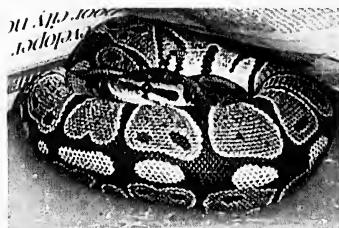
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All correspondence should be addressed to the Executive Editor. Manuscripts being submitted for publication should be typewritten (double spaced) on good quality 8 1/2 by 11 inch paper with adequate margins. Submit original and first carbon, retaining the second carbon. If entered on a word processor, also submit diskette and note word processor and operating system used. Indicate where illustrations or photographs are to appear in text. Cite all literature used at end in alphabetical order by author.

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